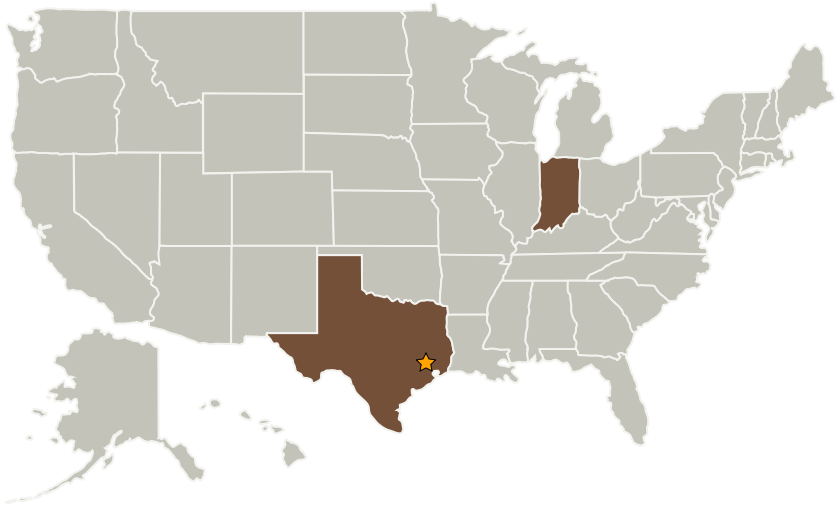
Microfluidic Analytical Separator for Proteomics, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

SHOT proposes an innovative microfluidic device designed to effect a 2-dimensional resolution of a mixture of proteins based on isoelectric point (pI) and molecular weight. A novel approach is proposed to achieve 2-D-gel equivalence. The first dimension is to be immobilized isoelectric focusing, and the second dimension will utilize an array of 100+ size-exclusion chromatography columns in microchannels. Molecular weight is recorded as each protein leaves each microcolumn. The output column number can be translated into pI. Thus each combination of output peak position and column number gives the combined values of pI and MW for each protein in the same way as does a ?spot? on a 2-D electrophoresis gel. Phase I research objectives are to (1) demonstrate the measurement of protein concentration in microchannels using a proposed electrical impedance method (2) construct and test immobiline channels and demonstrate their function in determining pI (3) construct a size-exclusion chromatography channel and demonstrate its function in determining molecular weight, and (4) identify fabrication steps for the integrated ?chip? to be tested in Phase II research. Also in Phase II research the device will be incorporated into an automatically controlled cassette configuration for operation in space flight and in the laboratory.

Primary U.S. Work Locations and Key Partners



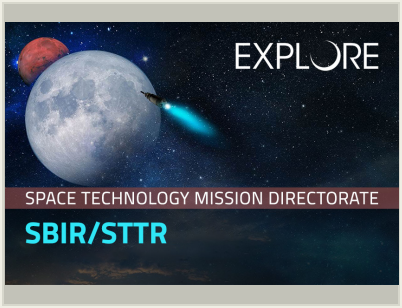


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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Techshot, Inc.	Supporting Organization	Industry	Greenville, Indiana

Primary U.S. Work Locations	
Indiana	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Mark S Deuser

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.5 Hybrids